WHAT IS CLAIMED IS:

1. A scanning apparatus for processing a substrate, the scanning apparatus comprising:

a base portion; and

an oscillatory subsystem, comprising:

a first link and a second link rigidly coupled to one another at a first joint, wherein the first link and second link are further rotatably coupled to the base portion by the first joint, therein defining a first axis of rotation,

an end effector coupled to the first link and spaced a first distance from the first joint, wherein the substrate generally resides on the end effector; and

a first actuator rigidly coupled to the base portion, wherein the second link is further coupled to the first actuator *via* at least a second joint, wherein the second joint is spaced a second distance from the first joint, and wherein the first actuator is operable to translate the second joint with respect to the base portion, therein rotating the first and second links about the first axis and translating the substrate along a first scan path.

2. The scanning apparatus of claim 1, wherein the first actuator comprises a curvilinear actuator.

3. The scanning apparatus of claim 2, wherein the curvilinear actuator comprises one or more rotary motor segments.

4. The scanning apparatus of claim 3, wherein the one or more rotary motor segments have a rotor arc of between approximately 45° and 90° and a stator arc of between approximately 80° and 120°.

5. The scanning apparatus of claim 2, wherein the curvilinear actuator comprises a brushless curvilinear motor.

6. The scanning apparatus of claim 5, wherein the brushless curvilinear motor comprises a non-ferrous core forcer.

7. The scanning apparatus of claim 5, wherein the brushless curvilinear motor comprises a ferrous core forcer.

8. The scanning apparatus of claim 7, wherein the brushless curvilinear motor comprises an opposed pair of ferrous core forcers sandwiched between a pair of magnetic tracks.

9. The scanning apparatus of claim 1, further comprising a second actuator, wherein the second actuator is coupled to the first joint, and wherein the second actuator is further operable to rotate the first joint with respect to the base portion.

10. The scanning apparatus of claim 9, wherein the second actuator comprises a servo motor fixedly mounted to the base portion.

11. The scanning apparatus of claim 9, wherein the second actuator is operable to vary a rotational velocity of the first joint in accordance with a location of the end effector.

12. The scanning apparatus of claim 1, wherein the first actuator is operable to vary a rotational velocity of the first joint in accordance with a location

of the end effector.

13. The scanning apparatus of claim 1, wherein the first link and the second link are generally co-linear.

14. The scanning apparatus of claim 1, wherein the first distance is larger than the second distance.

15. The scanning apparatus of claim 1, further comprising one or more encoders, wherein the one or more encoders are operable to determine a position of one or more of the first joint and the second joint.

16. The scanning apparatus of claim 1, further comprising a controller operable to control a translational velocity of the second joint by controlling an amount of power provided to the first actuator such that a velocity of the end effector is generally constant within a predetermined scanning range.

17. The scanning apparatus of claim 16, further comprising one or more sensing elements, wherein the one or more sensing elements are operable to sense a position of one or more of the first joint and second joint, and wherein the one or more sensing elements are further operable to feed back the respective sensed positions to the controller.

18. The scanning apparatus of claim 17, wherein the one or more sensing elements comprise one or more encoders.

19. The scanning apparatus of claim 18, wherein the one or more

sensing elements comprise one or more of a rotary encoder associated first joint and a linear encoder associated with the second joint.

20. The scanning apparatus of claim 1, wherein the first scan path is curvilinear.

21. The scanning apparatus of claim 1, wherein the end effector is operably coupled to the first link by a third joint, wherein the end effector is further operable to move in one or more directions with respect to the first link.

22. The scanning apparatus of claim 22, wherein the third joint comprises a prismatic joint and is operable to provide the end effector with two or more degrees of freedom.

23. The scanning apparatus of claim 22, wherein the third joint is operable to provide one or more of a rotation and a tilt of the end effector with respect to the first link.

24. The scanning apparatus of claim 1, wherein the end effector comprises an electrostatic chuck.

25. The scanning apparatus of claim 1, further comprising:

a second actuator rigidly coupled to the base portion, wherein the second actuator is operable to rotate the first joint with respect to the base portion; and

a third link rotatably coupled to the second link *via* the second joint, wherein the third link is further coupled to the first actuator *via* a fourth joint, and wherein the first actuator is further operable to translate the fourth joint with

respect to the base portion, therein driving the translation of the second joint.

26. The scanning apparatus of claim 25, wherein first actuator comprises a linear actuator and the second actuator comprises a rotary actuator, and wherein the second actuator is further operable to rotate the first joint in a clockwise and counter-clockwise direction.

27. The scanning apparatus of claim 25, further comprising a controller operable to control a translational velocity of the end effector by controlling an amount of power provided to the respective first actuator and second actuator.

28. The scanning apparatus of claim 27, further comprising one or more sensing elements, wherein the one or more sensing elements are operable to sense a position of one or more of the first joint, second joint, and fourth joint and wherein the one or more sensing elements are further operable to feed back the respective sensed positions to the controller.

29. The scanning apparatus of claim 28, further comprising:

a third actuator rigidly coupled to the base portion; and

a fourth link rotatably coupled to the second link *via* the second joint, wherein the fourth link is further coupled to the third actuator *via* a fifth joint, and wherein the third actuator is operable to translate the fifth joint with respect to the base portion, therein further driving the translation of the second joint.

30. The scanning apparatus of claim 29, wherein the first and third actuators each comprise a linear actuator and the second actuator comprises a rotary actuator, wherein the second actuator is operable to rotate the second joint

in a clockwise and counter-clockwise direction.

31. The scanning apparatus of claim 29, further comprising a controller operable to control a translational velocity of the end effector by controlling an amount of power provided to the respective first actuator, second actuator, and third actuator.

32. The scanning apparatus of claim 31, further comprising one or more sensing elements, wherein the one or more sensing elements are operable to sense a position of one or more of the first joint, second joint, fourth joint, and fifth joint, and wherein the one or more sensing elements are further operable to feed back the respective sensed positions to the controller.

33. The scanning apparatus of claim 32, wherein the one or more sensing elements comprise one or more encoders.

34. The scanning apparatus of claim 33, wherein the one or more sensing elements comprise one or more of a rotary encoder associated first joint and one or more linear encoders associated with one or more of the fourth joint and fifth joint.

35. The scanning apparatus of claim 1, further comprising a secondary translation mechanism operably coupled to the base portion, wherein the secondary translation mechanism is operable to move the base portion in one or more directions.

36. The scanning apparatus of claim 35, wherein the secondary

translation mechanism is operable to move the base portion along a second scan path, wherein the second scan path is generally perpendicular to at least a portion of the first scan path.

37. The scanning apparatus of claim 36, wherein the secondary translation mechanism comprises a linear drive system, wherein the linear drive system is operable to linearly translate the base portion along the second scan path.

38. The scanning apparatus of claim 36, wherein the secondary translation mechanism comprises one or more articulated arms, wherein the one or more articulated arms are operable to translate the base portion along the second scan path.

39. The scanning apparatus of claim 1, further comprising a rotary seal associated with the first joint, wherein the first link generally resides within a process chamber and the second link generally resides outside the process chamber, and wherein the rotary seal generally isolates an environment outside the process chamber from an environment within the process chamber.

40. The scanning apparatus of claim 1, further comprising a secondary actuation system, wherein the secondary actuation system is operable to counteract reaction forces induced by the oscillatory subsystem.

41. The scanning apparatus of claim 40, wherein the secondary actuation system comprises one or more masses rotatably coupled to the oscillatory subsystem.

42. The scanning apparatus of claim 41, wherein the secondary actuation system further comprises a counterbalance actuator operably coupled to the one or more masses.

43. The scanning apparatus of claim 40, wherein the secondary actuation system generally resides in an environment which is different than an environment in which the end effector generally resides.

44. A method for scanning a substrate, the method comprising:

providing a substrate on an end effector associated with a scanning apparatus, wherein the end effector is coupled to the first link of the scanning apparatus, the first link being rigidly coupled to a second link at a first joint, wherein the first link and second link are rotatably coupled to a base portion by the first joint, and wherein the scanning apparatus further comprises a first actuator rigidly coupled to the base portion, wherein the first actuator is further coupled to the second link *via* at least a second joint

translating the second joint with respect to the base portion in a first translational direction and a second translational direction *via* the first actuator, therein oscillating the end effector and substrate along a first scan path; and controlling a translational velocity of the second joint such that the end effector oscillates at a generally constant velocity within a predetermined scanning range of the end effector.

45. The method of claim 44, further comprising electrostatically clamping the substrate to the end effector.

46. The method of claim 44, further comprising linearly translating the base portion in a direction generally perpendicular to at least a portion of the first scan path, therein defined a second scan path.

47. The method of claim 46, wherein the linear translation of the base portion is slower than the translation of the end effector along the first scan path.

48. The method of claim 47, wherein the base portion is translated one increment for every half oscillation of the end effector.